88 02123

ALAMEDA COUNTY

Health Care Services Agency

Emergency Medical Services District

Preliminary Report of
Cost Analysis of Trauma Service

INSTITUTE OF GOVERNMENTAL STUDIES LIBRARY
JAN - 3 1989
UNIVERSITY OF CALIFORNIA

June 1988

Arthur Young
Health Care Services

Digitized by the Internet Archive
in 2024 with funding from
State of California and California State Library

https://archive.org/details/c124897523

8802123

ALAMEDA COUNTY

Health Care Services Agency

Emergency Medical Services District

Preliminary Report of
Cost Analysis of Trauma Service

INSTITUTE OF GOVERNMENTAL
STUDIES LIBRARY
JAN - 3 1989
UNIVERSITY OF CALIFORNIA

June 1988

Arthur Young

Health Care Services

EXECUTIVE SUMMARY

This Executive Summary briefly describes the most significant features of this Cost Analysis of Trauma Services performed for the Alameda County Emergency Medical Services District for Eden Hospital (Eden) and Children's Hospital Medical Center of Northern California (Children's). The third designated Trauma Center, Highland Hospital, will be addressed in a future report because necessary data was not available at the time this report was prepared.

This report utilizes hospital utilization and financial data to calculate the contribution made by trauma patients to each hospital's overhead expenses (Contribution Margin) and the amount by which the total amounts collected for trauma patients exceed (or fall short of) the total expenses of providing services to trauma patients (Trauma Gain (Loss)). These measures are calculated for two different periods: Period One, from July 1 to December 31, 1986, prior to Trauma Designation; and Period Two, from January 1 to June 30, 1987, following Trauma Designation.

The costs of providing regular hospital services to trauma patients were assigned to trauma in proportion to the amounts charged for the specific services received by trauma patients. These amounts are compared to the amounts collected for trauma patient services to calculate an overall Trauma Gain (Loss), which is one measure of the financial impact of trauma on the hospitals.

To adequately address the study's objective of measuring the impact of the changes caused by Trauma Center Designation, we must compare the amounts collected for trauma patient services to the way in which costs changed as a result of designation:

- *Fixed* costs are those costs that do not change with patient volume. For example, one more patient does not create the need for another building, or another Chief Executive Officer. These costs represent money that will be spent by the hospital whether patient volume increases or decreases (within a reasonable range)

- *Variable* costs, conversely, are those costs that do change with patient volume. The most obvious example is the cost of a bandage. If the patient were not seen at the hospital, the bandage would not have been used, and the cost would not have been incurred.

To measure the costs of providing services to trauma patients, both kinds of costs are important. Hospital management's decision to seek trauma designation should at least leave the hospital as well off financially as it was before designation (unless non-financial factors dictate otherwise, as discussed in the Findings section of this report). Since, by definition, the *Fixed Costs* would have been incurred whether or not the hospital sought designation and served additional trauma patients, they are not relevant to this comparison. If the amount collected for serving trauma patients is equal to or greater than the *Variable Costs* applicable to trauma patients, the hospital is as well off, or better off, than before designation. This amount is the *Contribution Margin* from serving trauma patients.

The results of the analysis are presented in the Trauma Statements of Revenue and Expenses on pages III-8 and III-9 (Eden) and III-21 and III-22 (Children's).

FINDINGS - GENERAL

The results can be used to set the general parameters for the negotiation of the financial relationships between the County and the designated hospitals. Both the Contribution Margin and the Trauma Gain (Loss) are important in determining these parameters.

The Trauma Center Designation contract contains provisions which allow the hospitals to request a subsidy "based upon a demonstrated need for a County subsidy as supported by an independent fiscal study, or ongoing annual audits conducted by the County." It is clear that a hospital with a Trauma Gain (after covering both fixed and variable costs) in Period Two would not be granted a subsidy. Conversely, a hospital would not be subsidized more than the Period Two Trauma Loss.

Determination of the appropriateness of a subsidy also must consider the net gains that might have been lost, had a different facility been granted Trauma Designation. The Contribution Margin in Period One represents the positive contribution to overhead made by patients who might have been routed elsewhere in Period Two if the hospital had not received Trauma Designation.

A positive Contribution Margin in Period Two demonstrates that the collections for trauma services exceed the additional expenses of caring for trauma patients. However, the facility can only remain in operation if all costs, including overhead costs, are covered by the

amounts received for patient activity. If the amounts collected for trauma patients cover only variable costs, additional amounts must be collected from other patients to cover the overhead costs for the trauma patients. Therefore, it would be appropriate to negotiate a minimum contribution margin percentage to determine if a subsidy is to be paid.

While this report is limited to a fiscal analysis of quantifiable factors, numerous non-financial or non-quantifiable impacts of Trauma Designation were identified during the course of the study. These factors, commonly referred to as the "halo" effect and detailed in the body of the report, could outweigh the financial results in determining the positive or negative impact of Trauma Designation.

However, the financial results can be summarized as follows:

- Both hospitals had better overall financial results from serving Trauma patients before designation than after
- The designation fee that the county can bill to the hospitals for its costs during the second six months of operating the Trauma System is $37,695. If, through weighing the overall impact of Trauma Designation, County policy makers determine that a subsidy is appropriate, then waiver of this fee might also be appropriate.

Beyond these similarities, the fiscal impact of Trauma Designation presents a different picture for each hospital.

FINDINGS - EDEN HOSPITAL

The Trauma Statements of Revenue and Expenses in the body of the Report present the fiscal impact of Trauma Designation. The following recap, from the Findings section of the Report, more clearly demonstrates the impact of designation:

	Contribution Margin	Trauma Gain (Loss)
Period One	$ 359,285	$(253,633)
Plus Period One Trauma Specific Costs	540,162	540,162
Non-Trauma Designation System Subtotal	899,447	286,529
Period Two	451,711	(547,345)
Comparison	$(447,736)	$(833,874)

Both the Contribution Margin and the Trauma Gain (Loss) show more negative results after designation than before, by $447,736 and $833,874, respectively. This would suggest that Trauma Designation was not financially beneficial to Eden Hospital. However, had the Trauma Designation been awarded to a different facility, Eden would have lost the $899,447 Contribution Margin and $286,529 Gain shown as the Non-Trauma Designation System Subtotal. After Designation, they were able to retain a Contribution Margin of $451,711 rather than losing all contribution from trauma patients, although they sustained a loss when overhead costs are considered.

Viewed in this way, although the Hospital did better before the implementation of a Trauma Designation System, it has benefited from Trauma Designation, considering the alternative of having the entire population of trauma patients routed to another facility.

Additional findings related to Eden include:

- The percentage of charges collected for services to trauma-type patients decreased in Period Two, perhaps due to an increasing number of indigent patients, some of whom were redirected to Eden because Highland Hospital could not accommodate them
- Trauma Specific Costs have a significant impact on the calculation of Contribution Margin and Trauma Gain (Loss) in both periods
- The Hospital experiences long collection periods for Kaiser trauma patients, and Kaiser appears to be unwilling to assist in streamlining trauma claims processing unless the Hospital is prepared to grant them a significant discount for prompt payment.

FINDINGS - CHILDREN'S HOSPITAL MEDICAL CENTER OF NORTHERN CALIFORNIA

Childrens' position as the primary provider of pediatric trauma services in Alameda County requires special consideration. Its unique standing makes it impractical to assume that a different facility could have substituted all medical services for the pediatric trauma population had the hospital not received Trauma Designation.

Before presenting the findings for Children's, a caution regarding the relationship of the data between the two periods is appropriate. Trauma patient revenue for the period after designation (Period Two) was 25 percent lower than in Period One, while the number of patients recorded in the Trauma Registry was 50 percent higher.

Hospital personnel attributed the increase in number of patients to including those patients with less critical injuries who received Trauma Consults in Period Two as trauma patients. These patients were probably not identified as trauma patients in Period One. This explanation of the increased patient count does not explain the lower trauma revenue, which would normally be expected to increase following Trauma Designation.

Hospital trauma staff suggested that more severe injuries to children happen in the summer months when children are not attending school. Since Period One included the summer months of July and August, they believe that it is reasonable that trauma revenue in Period One exceeded Period Two, even with a greater number of trauma patients in Period Two.

We investigated this unusual relationship in several ways and are satisfied that the data we analyzed accurately reflects the actual trauma patients treated in Period Two. However, the factors noted above would suggest that the fiscal results from the first six months of Trauma Designation should not be used to project the fiscal impact on future periods.

The Trauma Statements of Revenue and Expenses in the body of the Report present the results of the fiscal analysis.

The comparison of a non-Trauma Designation System period (Period One) with a Trauma Designation System period (Period Two) is calculated as follows:

	Contribution Margin	Trauma Gain (Loss)
Period One	$ (68,867)	$(777,814)
Less Period One Trauma Specific Costs	811,245	811,245
Non-Trauma Designation System Subtotal	742,378	33,431
Period Two	(907,523)	(1,341,891)
Comparison	$(1,649,901)	$(1,375,322)

Both the Contribution Margin and the Trauma Gain (Loss) show more negative results after designation than before, by $1,649,901 and $1,375,322, respectively. These figures are heavily influenced by the previously described drop in revenues from Period One to Period Two, and cannot reliably be used to determine the impact of designation. In view of the apparent seasonality of pediatric trauma, additional study is required before conclusions can be drawn about the impact of Trauma Designation on Children's.

While comparison between the two periods is inconclusive, the following comparisons of costs within Period Two are relevant:

- Collections for trauma patients were approximately equal to the fully allocated costs of providing regular hospital services to these patients. The Trauma Specific Costs engendered by meeting the Trauma Standards created a negative Contribution Margin in Period Two and comprise all or the majority of Trauma Loss in both periods. During our interviews, some Hospital personnel suggested that some of the Trauma Standards, such as the need to staff the Operating Room after midnight, may not be required for a pediatric trauma center

- Trauma Specific Costs represented 76 percent of Trauma Patient Revenues and 129 percent of the cash Collections for trauma patients

- Of the Trauma Specific Costs, $562,061 represents payments to physicians to be on-call 24 hours per day. This is equal to 58 percent of the cash Collections for trauma patients, and represents a readiness cost of nearly $1,700 per trauma patient.

- Another factor to consider in determining the fiscal impact of Trauma Designation on the Hospital is that the Hospital, or key operating areas such as the Intensive Care Unit, is operating at or near capacity. If beds were not filled with trauma patients, they might have had the opportunity to serve more profitable non-trauma patients. This capacity issue suggests that measurement of the fiscal impact of Trauma Designation for Children's needs to take into consideration the average profitability of non-trauma patients in comparison to trauma patients.

- The percentage of charges collected for services to trauma-type patients decreased in Period Two, perhaps due to an increased number of indigent patients or general tightening of payment standards

RECOMMENDATIONS

The results of this fiscal study can be used to set the parameters for determining the negotiated financial relationship between the County and the designated hospitals. In addition, a number of non-financial factors need to be considered, and some of our recommendations relate to these non-financial factors.

- This study should be expanded to include the six-month period immediately following Period Two, to assist in determining the fiscal impact of trauma on Children's. This would allow the comparison of periods with similar seasonal patterns.

- The County should begin negotiations with Eden Hospital to determine the financial relationship between the County and Eden. The negotiations should include discussions of a designation fee to defray the County's costs of operating the Trauma Designation System, the circumstances under which the County will pay a subsidy to cover losses from serving trauma patients, and the formula to be used to calculate the subsidy (such as guaranteeing the variable costs and a negotiated percentage of fixed costs). Once the negotiations are concluded, a regular reporting program for the financial data used to calculate the designation fee and/or subsidy should be designed.

- Representatives of the County, Eden and Highland Hospitals should meet to explore ways to reduce the instances when indigent trauma patients are redirected to Eden because Highland does not have the capacity to accept them. In California, counties have the legal responsibility, under Section 17000 of

the Welfare & Institutions Code, to care for indigent patients. Accordingly, when County-responsible indigent patients have been redirected to Eden, the County should explore methods to expedite their transfer back to Highland as soon as medically appropriate.

- The County Emergency Medical Services District and Children's should work together, with appropriate physician input and involvement, to evaluate the Trauma Standards for their applicability to pediatric trauma centers.

- County representatives should work with Kaiser to determine if a modification of their standard policies can be negotiated, since the Trauma Designation System directs trauma patients to designated Trauma Centers. In such circumstances, normal policies designed to ensure that Kaiser patients obtain services from Kaiser, unless prior authorization is obtained, may not be appropriate. At a minimum, if Kaiser would make claim forms available to the Designated Trauma Centers, patients could be requested to sign them at the time of service. This would streamline the processing of trauma claims and also reduce inconvenience for Kaiser patients who suffer a traumatic injury.

- The costs of meeting the Trauma Center Standards during the first six months of designation, without consideration of the regular hospital costs, exceeded the cash collections for serving trauma patients at Children's and represented a significant percentage of the collections for Eden. This would suggest that County officials and the trauma centers should explore, with appropriate medical staff involvement, any alterations in the standards which might reduce costs without compromising the quality of patient care.

I. INTRODUCTION

This study was performed for the Alameda County Emergency Services District, to provide the County and the Trauma Center hospitals with a tool to determine the financial impact of Level II Trauma Center Designation. Specifically, the financial results from serving trauma patients in the six-month period prior to designation were compared to comparable data for the first six months after designation.

In this section of the report, we present the objectives for the engagement, some of the background on trauma operations before and after trauma designation, and an analysis of the differences in operations caused by trauma designation.

This report is limited to a fiscal analysis of quantifiable factors. In accordance with the objectives stated in the engagement proposal to the Alameda County Emergency Medical Services District, we have:

- Developed the actual costs of services rendered to trauma patients at each hospital, as detailed in the appendices contained in separate volumes
- Developed a method (see Methodology section of this report) to enable the County to determine the cost of services rendered to trauma patients on an ongoing basis
- Determined the cash collected and/or to be collected by each hospital for trauma patients admitted during the study period before and after designation
- Developed a method that will enable the County to assess whether the designated hospitals are providing trauma services at a greater profit and/or loss after designation than before
- Provided financial analysis which will quantify the parameters to be used in any negotiations for either the payment of a subsidy by the County or the payment of a designation fee by the hospitals.

To analyze the fiscal impact of serving trauma-type patients before and after trauma designation, we performed financial calculations for the following periods:

Period One: Pre-Trauma Designation	July 1 to December 31, 1986
Period Two: Post-Trauma Designation	January 1 to June 30, 1987

Before presenting the results of the study, an understanding of the background is useful, as the historical backdrop provides a stronger framework for interpreting the financial results.

BACKGROUND

The Emergency Medical Services District completed a Trauma System Plan for Alameda County in May 1985. Following the plan's approval by the State Emergency Medical Services Authority, six hospitals participated in a competitive application process to receive trauma designation.

Following review of the applications, the following facilities were granted Level II trauma designation in January 1987:

Highland Hospital	Northern Alameda County
Eden Hospital	Southern Alameda County
Children's Hospital	Special Designation for Pediatric Trauma

The designation, formalized in contract form between Alameda County and the designated hospitals, remained silent as to which party (the hospitals or the County) would benefit from the gains or bear the losses resulting from the fiscal impact of trauma designation.

The contract does contain, however, broad parameters which are intended to guide "good faith" negotiations between the County and the hospitals. The following is a general restatement of the parameters contained in the contracts:

- The hospitals have the right to request a subsidy "based upon a demonstrated need for a County subsidy as supported by an independent fiscal study, or ongoing annual audits conducted by the County"
- The County has the right to bill the hospitals for a designation fee based on a percentage of the Emergency Medical Services District's expenses for administration of the Trauma Care System.

These parameters were built into the contracts because of uncertainty regarding the financial impact that Trauma Designation would have on the hospitals. The first provision presumes that hospitals should be protected from undue financial hardship in the course of providing trauma care to Alameda County residents.

Conversely, the second provision presumes that if hospitals benefit from patients routed by the Trauma System, then the facilities should reimburse the County for the costs of operating that system.

The following paragraphs describe the trauma system before and after designation.

Trauma System - Prior to Designation

Most hospitals in Alameda County operated emergency rooms and treated patients who arrived at the hospital by foot, by car, or by ambulance. The patient was brought to the hospital for any number of reasons including:

- The hospital was closest to the scene of an accident
- The patient or patient's family requested transport to the hospital based on their opinion of the hospital's emergency care or other factors
- The patient's doctor practiced at the hospital.

The hospital provided services to the patient which could range from evaluation by an Emergency Room physician and minimal treatment to extensive laboratory and x-ray procedures, surgery, and a lengthy stay in the hospital. The hospital would charge for these services and collect from the patient, Medicare, Medi-Cal, Health Maintenance Organization (HMO) or insurance company and write off the portion not collected.

To oversimplify the example, the extent to which these cash collections exceeded the cost of the bandages, x-rays, nurses' time, Emergency Room physicians' time and an allocated portion of the hospital's overhead represented the hospital's profits.

Trauma System - After Designation

The implementation of the Trauma System Plan changed the way services were provided to those patients with critical trauma injuries. Instead of spreading the trauma patients among 16 hospital emergency

departments in the County, the Trauma System directs those patients to the three designated hospitals.

To receive this designation, the hospitals have agreed to comply with a lengthy list of trauma standards which enhance the facility's capabilities to save the lives of patients with critical trauma injuries.

Those standards include, but are not limited to, the following:

- Multi-specialty surgeons on-call or on-site 24 hours a day
- 24-hour operating room fully staffed with Registered Nurses
- Increased staffing in the Emergency Room and the Intensive Care Unit
- Coordination of all departments in responding to a trauma triage
- Increased training and certifications for nursing staff and ancillary service technicians
- Special equipment
- Trauma room suites and dedicated Intensive Care Unit beds.

Upon the declaration of a triage, as determined by the paramedic or base-station physician, the entire trauma team stops regular patient care and stands ready to provide any service necessary to save the trauma victim's life. A triage "activation" fee is charged to the patient, and other services are billed as they were in the pre-designation period.

Post-designation Differences

The differences in operations before and after trauma designation suggest several key assumptions that will be used to quantify the fiscal impact of designation:

- The revenue billed and collected in treating trauma patients must be separately identified as it represents cash that would not have been collected without designation (i.e., those patients would have been routed to another hospital)
- The revenue billed and collected in treating trauma-type patients in the pre-designation period must also be identified for purposes of comparing the two periods. This amount should be representative of patients that would have been routed to other hospitals, had the study hospitals not been selected for trauma designation
- The cost of meeting the trauma standards is a "Trauma Specific Cost" which must be separately identified as it represents money that would not have been spent in the absence of trauma designation
- The additional costs of providing regular hospital services to those trauma patients who are admitted must also be identified, as these costs would not have been incurred without designation
- The cost of providing regular hospital treatment to trauma patients before designation must be quantified and matched with the corresponding cash collected for those services, so that the profitability between the two periods can be compared.

II. METHODOLOGY

This section defines the financial terminology used in reporting our findings and describes the steps taken to calculate the fiscal impact of Trauma Designation. This analysis was performed in the following sequence:

- Identification of trauma patients for the two study periods
- Identification of services delivered to trauma patients and corresponding charges
- Determination of the cash received, or to be received, by each hospital for services delivered to trauma patients
- Identification of trauma specific costs
- Identification of costs incurred for providing services to trauma patients, including analysis of fixed and variable expenses
- Illustrations of how the various components relate in performing the analysis.

DEFINITION OF TERMS

To accomplish the analysis summarized above, the financial terms used must be defined so that the variables can be clearly quantified from hospital records and the findings can be understood.

The population of *Trauma Patients* was tracked by the hospitals applying the Trauma Criteria issued by the County:

- In the six months prior to designation, hospitals started logging trauma-type activity in preparation for designation. At designation time, a formal computerized registry was in place which tracked trauma activity

- The logs contain patients which met the triage criteria, as well as those that received special consults from a trauma physician, as this was considered an added component of the trauma program.

Revenue represents the amounts charged to a patient for various services and supplies used in treatment. Essentially, hospitals have a price list, and patients are charged for the quantities used. A listing of those services are accumulated and billed to the patient, Medi-Cal, Medicare, or insurance company.

Bills for all patients identified in the logs were either electronically downloaded or manually entered into a computer database which summarized charges by patient service department.

Collections represent the amount of cash received from the party or parties which were billed. Not all billed charges are collected, for the following reasons:

- In some cases, the patient does not pay, and the unpaid charges are written off as a *bad debt*
- Medi-Cal, Medicare, and often insurance companies have contracts with the hospital where the hospital accepts less than the full amount as full payment. The difference between the total charges and the amount collected is a *contractual allowance*
- Both bad debts and contractual allowances serve to reduce gross revenue to *net revenue*, or actual cash *collections*.

Collections on trauma patient accounts were researched by the hospital staff. We then tested and analyzed the collection data:

- Actual cash collections were supported by collection history in the patients' files

- For those accounts that were unpaid at the time of analysis, estimates of future cash collections were made based on the hospitals' previous experience with the applicable payor

- The study did not attempt to include an adjustment for the interest that could have been earned if cash had been collected earlier. Such an adjustment would have the greatest impact for some categories of accounts which are ultimately collectible, but may take several years before collection. This is particularly true for accounts that will be settled through litigation.

Trauma Specific Costs represent expenditures made so that the hospital has the enhanced life saving capacity as prescribed in the standards for Level II trauma center designation. These costs are of two types:

- *Start-up costs* are those expenses incurred to bring the facility and its personnel into compliance with the Trauma Center Standards. This includes training and certifications for various staff and additional staff hired prior to the designation period, to facilitate the facility's readiness when the trauma program started

- *On-going trauma costs* are those additional expenditures made specifically to maintain the hospitals' readiness including increased staffing, payments to on-call physicians, and continuing staff education.

COSTING METHODOLOGY

Attributing costs to specific patient treatments is a complex area where an understanding of methodology is especially important.

In an ideal environment true costs would be identified by the components of any given procedure. For example, a lab test (such as a blood chemistry) may require five minutes of a nurse's time to draw

the blood, 10 minutes of a courier's time to deliver the blood to the laboratory, and 15 minutes of a laboratory technologist's time to process and read the test results, as well as supplies such as needles, test tubes and reagents. Once the various components have been identified, a cost could be determined for each.

The result would be a direct cost for the procedure, which would not include any indirect costs (i.e. the laboratory director's salary) or hospital overhead costs (i.e. data processing, plant maintenance, or administration). To precisely allocate these indirect and overhead costs, a cost accounting system which allows for allocation of indirect and overhead costs to each procedure performed in the hospital would be required.

As we described in the engagement proposal, costing at this level of detail is quite time consuming and resource intensive and the information required from the study hospitals would have been prohibitive. Very few hospitals currently have systems in place to provide procedural-level costing data.

Costing at the departmental level rather than the procedural level corresponds to the way in which expenses are recorded in the accounting records of the hospital. This approach is not as accurate as procedural costing, because total costs are applied to services within each department based on either a workload measurement unit or the price charged for each service. To the extent that the relationship between the cost of performing a service and either the workload units assigned to that service or the price charged for it differs from the average for that department, the departmental method will overstate or understate the cost of some services. For example,

if the true cost (as determined at the procedure level) of performing a laboratory test is $5.00, and the price for that test is $7.50, but the average relationship between costs and prices for the laboratory is 80%, the departmental costing methodology would assign a cost of $6.00 ($7.50 times 80%) to the example test, rather than the accurate cost of $5.00.

Our analysis utilized the existing hospital accounting records to perform the more cost-effective departmental costing. The County and the hospitals, recognizing the limitations of the data available, have agreed that departmental costing is the most reasonable method for accomplishing the study objectives.

The following explains the financial data used in departmental costing:

- California hospitals are required by law to use standard departments, defined by the Office of Statewide Health Planning and Development, to record expenses. Within the standard departments, expenses are classified in general categories such as salaries, benefits, supplies and depreciation. Salary costs are further categorized by employee classifications such as managers and supervisors, registered nurses, technicians, and clerical staff

- *Direct Patient Service Costs* are those expenses directly incurred by the departments that provide medical care to patients, such as laboratory, radiology and hospital nursing units

- *Support Department Costs* are expenses necessary for the operation of the hospital, but which are not directly tied to patient treatment, such as plant maintenance, public relations, patient accounting, and administration

- Statistics were collected from the hospitals to provide a basis for allocation of the Support Department Costs to the Patient Service Departments. These statistics are intended to represent the services provided by each Support Department to Patient Service Departments. (An example

would be the use of square footage to allocate housekeeping costs.) This *stepdown allocation* followed the methodology prescribed, both by Medicare and the Office Of Statewide Health Planning and Development, for their annual financial disclosure reports. In this methodology, costs are allocated, or "stepped down" only to remaining departments (those that have not themselves been allocated)

- Total departmental revenue was used to assign the Direct Patient Service Costs and Support Department Allocated Costs, which were calculated in the previous steps, to trauma services. The ratio of total department costs to charges was calculated, then multiplied by charges for trauma patients to calculate *Trauma Patient Costs.*

Our objective was to use this data to quantify the cost of providing services to trauma patients. Two concepts are important in measuring these costs. The first is the concept of fixed and variable costs:

- *Fixed costs* are those costs that do not change with patient volume. For example, serving one more patient does not create the need for another department manager, another receptionist, a new building, or another Chief Executive Officer. These costs represent money that will be spent by the hospital whether patient volume increases or decreases (within a reasonable range)

- *Variable costs*, conversely, are those costs that do change with patient volume. The most obvious example is the cost of a bandage. If the patient were not seen at the hospital, the bandage would not have been used, and the cost would not have been incurred. Other examples would be nursing time required to care for additional patients and technicians' time to perform diagnostic tests.

To measure the costs of providing services to trauma patients, both kinds of costs are important. Hospital management's decision to seek trauma designation (and provide services to trauma patients) should at least leave the hospital as well off financially as it was before designation (unless non-financial factors dictate otherwise, as

discussed in the Findings section of this report). Since, by definition, the *Fixed Costs* would have been incurred whether or not the hospital sought designation and served additional trauma patients, they are not relevant to this comparison. If the amount collected for serving trauma patients is equal to or greater than the *Variable Costs* applicable to trauma patients, the hospital is as well off, or better off, than before designation.

On the other hand, the hospital's *Fixed Costs* must be paid in order for the hospital to continue operations. If collections for trauma patients do not cover their share of the fixed costs, other patients must be charged more to make up the difference.

The second important concept is the concept of directly identifiable costs. Those costs which relate specifically to a new activity, including the costs of preparing to participate in that activity, should be entirely assigned to the new activity to measure its financial impact. To identify these costs, we asked hospital personnel to answer the following questions:

- How much of the Period One expenses are directly attributable to preparing for trauma designation?
- How much of the Period Two expenses are directly attributable to meeting the trauma standards?

DEPARTMENTAL INTERVIEWS

To learn more about the hospitals' costs, we conducted interviews with hospital department managers from the departments which deliver the most services to trauma patients.

During the interviews we discussed how the trauma designation had affected their departments. Much of the impact noted was non-financial or non-quantifiable, ranging from the increased ease of recruiting professional staff because of the prestige of being a trauma center to the disruption of regular patient service whenever there was a trauma activation. These items will be further discussed in the Findings section of this report.

To identify directly identifiable trauma costs (answering the two questions outlined above) we provided the hospitals with forms which could be researched and completed by the department managers we interviewed as well as the managers of any other departments that were required to spend more money to prepare for trauma designation or to meet the trauma standards.

To identify the fixed and variable components of costs, an analysis of cost behavior in relation to volume was required. Our objective was to answer the following questions:

- How were the hospitals' costs affected by increased volume resulting from the Trauma System routing critically injured patients to their facilities?
- Or, if the designation had been given to another facility, how would this have affected the hospitals' costs?

In our interviews, we explained the concept of fixed and variable costing and requested department managers to assist in identifying fixed costs for Period One. To do so, we asked them to consider the question:

> "What happens to your department when you serve more patients, or if fewer patients need your services?"

We obtained detailed departmental expense statements for Period One and discussed them with each manager. The interviews identified the patient care activities represented by each expense classification. The above question was applied to each expense category to gain a clearer understanding of its variability.

This review of the expense detail also helped identify those costs which were incurred specifically to meet the trauma standards. These costs were excluded from the fixed and variable analysis and assigned directly to trauma services.

To determine the variability of expenses in the patient service departments not interviewed (which provided less than 20% of services to trauma patients) and the support departments, we initially classified each detailed category of expenses as fixed or variable, based on our understanding of hospital operations, and then reviewed our classifications with hospital financial personnel to obtain their concurrence.

By excluding *Trauma Specific Costs*, and costs which are variable, we were able to achieve our objective of identifying the hospitals' fixed costs.

Because of the significance of the fixed and variable analysis, we performed additional testing to validate the information gained from the department interviews. Once we validated the reasonableness of our analysis, we were able to assume that the fixed costs of Period One can be carried forward as the fixed costs of Period Two, because, by definition, fixed costs do not vary.

SUMMARY OF DATA GATHERED

As we gathered hospital financial and statistical data, it was entered into a computer database for each hospital. These databases contained the following information:

- Trauma Patient Revenue by department for both study periods
- Trauma Patient Collections for both study periods
- Total Hospital Revenue by department for both study periods
- Total Hospital Expenses by department for both study periods
- Trauma Specific Costs by department for both study periods
- Adjusted Hospital Expenses by department for both study periods. (This total reflects total hospital expenses reduced by Trauma Specific Costs, which were deducted from total expenses and directly assigned to trauma services)
- Hospital Fixed Expenses by department for both periods
- Hospital Variable Expenses by department for both periods (calculated by subtracting fixed expenses from adjusted expenses).

DEPARTMENTAL COSTING METHODOLOGY

We used the data elements summarized above to assign costs to trauma services using the departmental costing methodology.

The first calculation consisted of allocating the support department expenses to the patient service departments according to the

methodology described earlier. This calculation was performed for four separate expense statements:

- Adjusted Hospital Expenses for Period One
- Hospital Fixed Expenses for Period One
- Adjusted Hospital Expenses for Period Two
- Hospital Fixed Expenses for Period Two.

The calculation starts with the Adjusted Hospital (departmental) Expenses, then allocates the support department expenses to patient service departments based on statistical measures of services provided by the support departments to the patient services departments. The result is support department allocated expenses for each patient service department. The same calculation is performed for Hospital Fixed expenses. Corresponding Hospital Variable Expenses were calculated by subtracting Hospital Fixed Expenses from Adjusted Hospital Expenses for each patient service department.

The following matrix summarizes the expense data elements generated by this analysis for each department and each period:

Direct Patient Service Expenses	Fixed	Variable	Total
Support Department Allocated Expenses	Fixed	Variable	Total
Fully Allocated Expenses	Fixed	Variable	Total

The next step was to calculate a cost to charge (CC) ratio. Each of the nine calculated expense totals, as shown, was divided by total revenue for each department. The cost to charge ratios identify how much the hospitals had to spend, in each expense category, for every dollar of revenue generated.

We calculated nine cost to charge ratios for each department, one for each of the nine expense totals.

TRAUMA PATIENT COSTS

The results of the departmental costing calculations were then used to calculate how much it cost the hospitals to provide care to trauma patients.

As explained earlier, the charges billed to trauma patients were summarized by department. Multiplying those departmental revenue amounts for trauma patients by the cost to charge ratios for each department provided the cost of providing regular hospital services to trauma patients.

To illustrate this calculation on a micro basis, a hypothetical trauma patient receives a $50 laboratory test.

The hypothetical cost to charge ratios were as follows:

	Fixed	Variable	Total
Direct Departmental CC Ratio	.10	.45	.55
Support Department CC Ratio	.30	.05	.35
Fully Allocated CC Ratio	.40	.50	.90

The hypothetical costs to provide the treatment were as follows:

	Fixed	Variable	Total
Direct Departmental Costs	$ 5.00	$22.50	$27.50
Support Department Allocated Costs	15.00	2.50	17.50
Fully Allocated Costs	$20.00	$25.00	$45.00

We can use this hypothetical calculation to illustrate how the hospitals' total trauma costs will be used to determine the impact of designation, and to define some terms which will be used in the final analysis.

To complete the example, the hospital has a contract with the hypothetical trauma patient's insurance company to accept 80 percent of charges as full payment. In the analysis, Trauma Specific Costs are assigned directly to trauma services as a grand total. However, for purposes of the example, we will assume Trauma Specific Costs consisted of $5 worth of standby time spent by the lab technician.

EXAMPLE TRAUMA STATEMENT OF REVENUES AND EXPENSES

TRAUMA PATIENT REVENUE	$50.00		
LESS AMOUNT NOT COLLECTIBLE: Contractual Allowance	$10.00		
TOTAL COLLECTIONS (80% of charges)		$40.00	$40.00
TRAUMA PATIENT COSTS	Fixed	Variable	Total
Direct Patient Service Costs	$ 5.00	$22.50	$27.50
Support Department Allocated Costs	15.00	2.50	17.50
Trauma Specific Costs		5.00	5.00
CONTRIBUTION MARGIN		$10.00	
TRAUMA GAIN (LOSS)			($10.00)

To interpret the information in the example, the concept of fixed and variable costs is important. As previously discussed, to measure whether the hospital is better off after designation than before, it is necessary to compare the collections received for services provided to trauma patients with the additional costs incurred because trauma patients are now directed to the hospital. The difference is the *Contribution Margin*. As described above, fixed costs are excluded from this calculation because they would have been incurred by the hospital, whether the trauma patient was treated or not.

On the other hand, the *Trauma Gain (Loss)* better measures the degree to which trauma patients are covering their share of the hospital's fixed costs. If they are not (i.e., the amount is a loss), other patients must be charged more to make up the difference.

III. FINDINGS AND RECOMMENDATIONS

The results of this study can be used to define the financial impact of trauma designation on the designated hospitals. The degree to which collections for trauma patients cover the variable costs associated with serving those patients, and the contribution they provide, if any, to hospital's overhead costs can be measured. However, there is no generally accepted standard to determine the appropriate relationship between hospitals providing trauma services and the governmental entity in whose jurisdiction the services are provided.

One possible relationship could be based on the the Medicare program, the Federal governmental program designed to compensate hospitals for serving aged patients. In the past, Medicare generally paid hospitals the fully allocated costs of serving Medicare patients, although they began applying limitations to the amount of fully allocated costs they would pay in more recent years. Most recently, Medicare has discontinued the use of costs as a basis for hospital compensation, using instead a complex formula based on the patient's diagnosis.

In the absence of a generally accepted standard, the results of this study can only set the general parameters of the negotiated financial relationship between the hospitals and the County. Ultimately, the specific terms of the relationship are a matter for negotiation between the County and the hospitals, and the top management of each hospital will need to determine their own negotiating position.

FINDINGS - GENERAL

The Contribution Margin and the Trauma Gain (Loss) for the two study periods are the most important indicators of the financial impact of trauma designation on the hospitals. As previously discussed, the contribution margin is most relevant in evaluating situations, such as the trauma designation, where new relationships cause a change in patient service volume.

Designation Fee

The current contract provides for the payment of a designation fee by the designated hospitals, but does not define the relationship, if any, between the designation fee and the financial impact of trauma on the hospitals. However, the hospital's ability or willingness to pay such a fee would, of course, be affected by their perception of the financial contribution made by trauma patients.

A designation fee would be appropriate if the financial performance of the hospital were enhanced by trauma designation. Whether Eden was better off before or after trauma designation can be determined by comparing the Contribution Margins for the study periods. If the Contribution Margin increased from Period One to Period Two, then a designation fee could be considered.

The amount of the designation fee that the hospitals might be willing to accept would be limited by two factors. The first is the existing contract. According to the contract, the County has the right to recover 75 percent of its costs for administering the Trauma System, after the first six months of operation, from the hospitals. With

three designated hospitals, each hospital's fee would be 25 percent. For the six-month period from January 1, 1987 to June 30, 1987, the County's costs for administering the Trauma System were $150,780. The maximum designation fee, at 25 percent per hospital, would be $75,390 per hospital on an annual basis.

The other limiting factor would be the financial contribution from serving trauma patients. It would be a poor management decision for a hospital to pay a designation fee beyond the economic benefit of designation. Of course, other non-financial factors also must be considered and could overshadow the economic analysis.

Subsidy

The contract also provides for the potential payment of a subsidy from the County to the hospitals to offset financial losses from serving trauma patients.

The amount of subsidy which would be appropriate is also a matter for negotiation. Again, the Contribution Margin and Trauma Gain (Loss) can be used to set the general parameters for the negotiation. It is clear that a hospital with a Trauma Gain (after covering both fixed and variable costs) in Period Two would not be granted a subsidy. Conversely, a hospital would not be subsidized more than the Period Two Trauma Loss.

Other comparisons need to be factored in to complete any subsidy equation. The financial impact needs to include the net gains that would have been lost, had a different facility been granted Trauma Designation. The Contribution Margin in Period One provides this

measure, as it represents the positive contribution to overhead made by patients who would have been routed elsewhere in Period Two without Trauma Designation.

The Period Two Contribution Margin stands alone as an indicator of fiscal impact. As defined earlier, a positive contribution to overhead demonstrates that the collections for trauma services exceed the additional expenses of caring for trauma patients. However, the facility can only remain in operation if all costs, including overhead costs, are covered by the amounts received for patient activity. If the amounts collected for some patients cover only variable costs, additional amounts must be collected from other patients to cover the overhead costs for the first group of patients. Therefore, a negotiated minimum contribution margin percentage would be appropriate to determine if a subsidy is to be paid.

Other Factors

Other non-financial or non-quantifiable factors complicate the determination. For example, if a hospital had to turn away non-trauma patients because the entire facility, or one of its departments, was filled to capacity, then the lost profits from serving those patients could become a factor. This capacity issue, while not quantified in this study, would suggest that Eden should be reimbursed for its lost profits on patients turned away, effectively reducing the Contribution Margin on trauma patients.

Throughout the study, factors commonly referred to as the "halo" effect, were brought to our attention. While these factors are

outside the quantifiable realm of this fiscal analysis, they could be of critical importance in evaluating the impact of designation. Both positive and negative effects were described:

Positive Effects

- Increased prestige through providing life-saving capabilities to the community
- Enhanced ability to recruit physicians and professional staff, which is especially valuable for positions where there is a shortage of trained professionals
- Closer relationships with on-call physicians, who may utilize the facility for elective procedures on patients from whom a greater percentage of charges can be collected, in addition to serving trauma patients
- Increased use of the facility for elective procedures by former trauma patients
- The Trauma Specific Costs identified in the analysis may have enabled Eden to increase services to non-trauma patients, resulting in increased revenue and corresponding cash collections. While the extent of this revenue cannot be quantified without detailed analysis beyond the scope of this report, examples of revenue which could offset a portion of the Trauma Specific Costs include:
  - Emergency Room services provided to non-trauma patients by the additional personnel hired to meet Trauma Standards
  - Non-trauma charges generated in the 24-hour Operating Room (required by the Trauma Standards)
  - Increased non-trauma services provided by Radiology technicians hired specifically for trauma.

Negative Effects

- Lost revenue for regular patient care because trauma patients are given priority treatment. (Physicians may schedule non-trauma patient services at other hospitals to avoid having their patients being "bumped" by trauma patients)
- Disruption to department operations when staff responds to trauma triage calls
- Premium rates for certain specialties to assure 24-hour availability of multi-specialty physicians (required by the Trauma Standards)
- Decreased morale as increased workload is absorbed by salaried department managers
- Overloaded Intensive Care Units (ICU), compounded by the current shortage of ICU nurses
- Delay in payment for patients who are Kaiser Permanente members. Kaiser subjects trauma claims to the same review process that it uses when members choose to receive services from non-Kaiser facilities. In addition, all trauma patient bills are subjected to an additional medical review, which has a "considerable backlog" (according to a Kaiser official interviewed during the project).

As noted earlier, these factors, individually or in the aggregate, could be considered more important than the financial analysis in determining the positive or negative impact of Trauma Designation.

The Trauma Statements of Revenue and Expenses for each hospital, and a discussion of the preceding analytical guidelines, are presented in the following sections.

FINDINGS - EDEN HOSPITAL

The Trauma Statements of Revenues and Expenses for Eden Hospital (Eden) are presented on the following pages. Detailed schedules documenting the flow of financial data to arrive at the Trauma Gain (Loss) and the Contribution Margin for both Period One and Period Two are included in a separate volume as Appendix I to this report. In the Methodology section of this report, we have described the calculations and their significance. An understanding of the methodology is an integral part of understanding and interpreting the results.

As detailed in the Trauma Statements of Revenues and Expenses, the financial results are as follows:

	Contribution Margin	Trauma Gain (Loss)
Period One	$359,285	$(253,633)
Period Two	$451,711	$(547,345)

Collections

The percentage of charges collected for serving trauma-type patients decreased in the period after Trauma Designation (Period Two). The percentages collected for the two periods were as follows:

	Period One	Period Two
Trauma Patient Revenue	$1,860,693	$3,672,495
Trauma Patient Collections	$1,403,319	$2,468,418
Percentage Collected	75%	67%

EDEN HOSPITAL

TRAUMA STATEMENT OF REVENUES AND EXPENSES
JANUARY 1, 1987 TO JUNE 30, 1987

(Post-Designation Period)

TRAUMA PATIENT REVENUE

Medi-Cal	190,973	
Medicare	412,208	
Contract	506,584	
Insurance	1,413,598	
Self-Pay	1,149,132	3,672,495

LESS AMOUNT NOT COLLECTIBLE

Contractual Allowances and Bad Debts:		
Actual	1,053,644	
Estimated	150,433	1,204,077
Net Revenue		2,468,418
Add Medicare Capital Cost Reimbursement		34,770

TOTAL COLLECTIONS		2,503,188	2,503,188
TRAUMA PATIENT COSTS	FIXED	VARIABLE	TOTAL
	(Fr. Schedule Q)	(Fr. Schedule Q)	
Direct Patient Service Costs	356,375	794,059	1,150,434
	(Fr. Schedule Q)	(Fr. Schedule Q)	
Support Department Allocated Costs	642,681	123,439	766,120
		(Fr. Schedule M)	
Trauma Specific Costs		1,133,979	1,133,979
CONTRIBUTION MARGIN		451,711	
TRAUMA GAIN <LOSS>			<547,345>

EDEN HOSPITAL

TRAUMA STATEMENT OF REVENUES AND EXPENSES
JULY 1, 1986 TO DECEMBER 31, 1986
(Pre-Designation Period)

TRAUMA PATIENT REVENUE

Medi-Cal	98,973	
Medicare	12,423	
Contract	86,788	
Insurance	1,139,310	
Self-Pay	523,199	1,860,693

LESS AMOUNT NOT COLLECTIBLE

Contractual Allowances and Bad Debts:		
Actual	447,633	
Estimated	9,741	457,374
Net Revenue		1,403,319
Add Medicare Capital Cost Reimbursement	1,048	

TOTAL COLLECTIONS		1,404,367	1,404,367
TRAUMA PATIENT COSTS	FIXED	VARIABLE	TOTAL
Direct Patient Service Costs	(Fr. Schedule E) 214,028	(Fr. Schedule E) 466,349	680,377
Support Department Allocated Costs	(Fr. Schedule E) 398,890	(Fr. Schedule E) 38,571	437,461
Trauma Specific Costs		(Fr. Schedule A) 540,162	540,162
CONTRIBUTION MARGIN		359,285	
TRAUMA GAIN <LOSS>			<253,633>
STARTUP COSTS PRIOR TO PERIOD ONE			820,143

Hospital personnel attributed a portion of the decrease in collections to an increasing number of indigent patients, some of whom were redirected to Eden because Highland Hospital, the County facility, could not accommodate them because their Intensive Care Unit (ICU) was full.

Although not reflected in the calculation of collection percentage or the costs attributed to serving trauma patients, another factor that affects Eden's financial results from trauma is the long collection period they have experienced for services provided to Kaiser patients. As previously described, Kaiser subjects all trauma claims to additional medical review, and claims processing for these patients has been backlogged. To understand the processing flow and determine if streamlined procedures might alleviate the long collection periods, we met with Kaiser representatives to discuss trauma claim processing. Kaiser's policy, which is common among similar Health Maintenance Organizations (HMOs), is that their members should receive services only from Kaiser facilities, unless they receive prior authorization to obtain services elsewhere. In the case of emergency services, authorization is to be obtained as soon as possible after the emergency condition has been alleviated. Accordingly, when a Kaiser member receives services at another facility, it is the member's responsibility to complete a claim form requesting reimbursement for the other services. Until the claim form is completed and received by Kaiser, it is the HMO's position that no liability for services exists. The claim forms are available only from Kaiser, and are furnished only to the patient.

Kaiser officials indicated that if a non-Kaiser hospital was willing to negotiate a business relationship with Kaiser, including granting a significant discount for prompt payment, a supply of the claim forms could be provided to Eden for distribution to Kaiser

patients at the time of service. In addition, other modifications to the normal claims processing for that hospital could be discussed. Without such a relationship, Eden would continue to be required to request that patients obtain, complete and file the claim forms before Eden could be reimbursed for services to Kaiser patients.

As an accommodation to Eden in this particular circumstance, Kaiser officials did agree to send letters to patients identified by Eden as Kaiser members who had received trauma services, requesting the patients to complete a claim form. However, Kaiser was unable to identify many of the patient names Eden supplied to them as Kaiser beneficiaries, and could not contact the patients. It is beyond the scope of this study to determine if the inability to identify these patients resulted from Eden's failure to obtain identifying information or was due to deficiencies in Kaiser's beneficiary eligibility systems.

Trauma Specific Costs

As previously described, Trauma Specific Costs, the costs of meeting the Trauma Standards, are deducted in full to determine the Contribution Margin and Trauma Gain (Loss). These costs, which are significant to the analysis, are as follows:

Period One	$ 540,162
Period Two	$1,133,979

Period One Trauma Specific Costs consist primarily of start-up costs, while the Period Two amounts represent ongoing costs of meeting Trauma Standards. The Period One start-up costs were removed from

the costs to compare the normal costs of serving trauma-type patients without a Trauma Designation System in Period One, to the costs of serving trauma patients under the Trauma Designation System in Period Two. In Period Two, Trauma Specific Costs were allocated entirely to trauma patients. The Trauma Specific Costs for Period Two were as follows:

24-hour multi-specialty physician coverage, both on-call and on-site	$ 563,754
Increased emergency room staffing, including Trauma Director	151,400
Emergency Room supplies and minor equipment	21,129
Depreciation on equipment purchased for trauma	9,018
Emergency Room purchased services, including housing to accommodate 24-hour physician coverage	18,105
Additional staff for 24-hour Surgery and Recovery	190,257
Central Service staff time to restock trauma supply carts	1,421
Additional Credit and Collections staff	9,537
Additional Social Services staff	15,995
Nursing training costs	1,963
Additional Laboratory staff	55,744
Nursing time to respond to trauma calls	4,049
Radiology technician standby costs and time spent responding to trauma calls	84,095
Respiratory therapy staff response to trauma calls	7,512
Trauma Specific Costs, Period Two	$1,133,979

In the period prior to designation, Eden began following some of the trauma protocols and began responding to trauma calls as if it were a Trauma Center. Because Period One is considered a non-Trauma Designation System period, the Trauma Specific Costs were identified, and then removed to properly reflect regular Hospital operations.

The costs for preparing for Trauma Designation included the following items and amounts:

Administrative salaries for establishing the Trauma Program	$ 50,987
Physician contracts started prior to designation	432,075
Depreciation on equipment purchased for trauma	7,505
Consulting services used in preparing for Trauma Designation	24,710
Trauma Department supplies and minor equipment purchases	13,234
Central Service purchase and stocking of trauma carts	2,204
Nursing time to respond to trauma calls	3,853
Emergency Room minor equipment	1,438
Increased orientation for Laboratory staff	2,746
Respiratory therapy staff response to trauma calls	1,410
Trauma Specific Costs, Period One	$540,162

The preparation costs incurred prior to Period One must also be included in total start-up costs:

Physician contracts started prior to designation		$354,150
Equipment purchased for Trauma Designation:		
Equipment cost	$201,934	
Less depreciation expensed	(16,523)	
Undepreciated equipment cost		185,411
Consulting services used in preparing for Trauma Designation		75,452
Administrative salaries for establishing the Trauma Program		53,045
Seminars and training for Nursing staff prior to Period One		51,239
Emergency Room purchased services, including housing to accomodate 24-hour physician coverage		25,959
Seminars and training for non-nursing staff prior to Period One		25,524
Trauma Department supplies and minor equipment purchases		15,762
Other expenses		14,735
Training for Emergency Room staff		12,196
Central Service purchase and stocking of trauma carts		3,216
Emergency Room minor equipment rental		2,948
Trauma Department utilities		506
Trauma Specific Costs, Prior to Period One		$820,143

Both the Period One start-up costs and prior expenditures represent money spent to become a Trauma Center, and have no impact on future financial statements (except for the undepreciated equipment total, which will be recognized as depreciation in future periods). These numbers are presented as a historical footnote, and should be considered along with operating results during any future negotiations.

Impact of Trauma Designation System

The comparison of a non-Trauma Designation System period (Period One) with a Trauma Designation System period (Period Two) is calculated as follows:

	Contribution Margin	Trauma Gain (Loss)
Period One	$ 359,285	$(253,633)
Plus Period One Trauma Specific Costs	540,162	540,162
Non-Trauma Designation System Subtotal	899,447	286,529
Period Two	451,711	(547,345)
Comparison	$(447,736)	$(833,874)

Both the Contribution Margin and the Trauma Gain (Loss) show more negative results after designation than before, by $447,736 and $833,874, respectively. This would suggest that Trauma Designation was not financially beneficial to Eden Hospital. However, had the Trauma Designation been awarded to a different facility, Eden would have lost the $899,447 Contribution Margin and $286,529 Gain shown as

the Non-Trauma Designation System Subtotal. After Designation, they were able to retain a Contribution Margin of $451,711 rather than losing all contribution from trauma patients, although they sustained a loss of $547,345 when overhead costs are considered.

Viewed in this way, although Eden did better before the implementation of a Trauma Designation System, it has benefited from Trauma Designation, considering the alternative of having the entire population of trauma patients routed to another facility.

If Eden had not received Trauma Designation, but instead had replaced the trauma-type patients with an alternative source of patients, the gain from Trauma Designation would change, depending on the contribution margin on the replacement patients.

Summary

The following is a restatement of the perspective provided by this analysis:

- Eden had better financial results from serving trauma-type patients before implementation of the Trauma Designation System
- After implementation of the Trauma Designation System, Eden's financial performance benefited more from Trauma Designation, than it would have had another hospital received the Designation. This is demonstrated by the positive Period Two Contribution Margin
- Eden benefits from having trauma patients directed to the facility, but the economic gains from serving trauma patients are not as great as those realized from patients served in the regular Hospital operations. This is measured by the Trauma Loss when overhead costs are included

- The percentage of charges collected for services to trauma-type patients decreased in Period Two, perhaps due to an increasing number of indigent patients

- Trauma Specific Costs have a significant impact on the calculation of Contribution Margin and Trauma Gain (Loss) in both periods

- Trauma start-up costs should be factored into any future calculations of trauma fiscal impact, to recognize these one-time costs of gaining Trauma Center designation

- The Hospital experiences long collection periods for Kaiser trauma patients, and Kaiser appears to be unwilling to assist in streamlining trauma claims processing unless the Hospital is prepared to grant them a significant discount for prompt payment.

FINDINGS - CHILDREN'S HOSPITAL MEDICAL CENTER OF NORTHERN CALIFORNIA

The Trauma Statements of Revenues and Expenses for Children's Hospital Medical Center of Northern California (Children's) are presented on the following pages. Detailed schedules documenting the flow of raw financial data to arrive at the Trauma Gain (Loss) and the Contribution Margin for both Period One and Period Two are included in a separate volume as Appendix II to this report. In the Methodology section of this report, we have described the calculations and their significance. An understanding of the methodology is an integral part of understanding and interpreting the results.

Comparison of Period One and Period Two Data

Before presenting the findings for Children's, a caution regarding the relationship of the data between the two periods is appropriate. Trauma patient revenue for the period after designation (Period Two) was 25 percent lower than in Period One, while the number of patients recorded in the Trauma Registry was 50 percent higher.

Hospital personnel attributed the increase in number of patients to the inclusion in the Trauma Registry (and hence in the count of trauma patients) those patients with less critical injuries who received Trauma Consults in Period Two. The methodology for recording trauma patients was less sophisticated in Period One, and Trauma Consults were probably not identified as trauma patients. Nevertheless, this explanation of the increased patient count does not explain the lower trauma revenue. Normally, it would be expected that Trauma Designation would result in increased trauma revenue.

We investigated this unusual relationship in the following manner:

- Trauma patient account balances were sorted by total charges. There were roughly twice the number of accounts with large balances in Period One than in Period Two

- Hospital personnel carefully reviewed the facility records for Period Two for admitting diagnoses indicating critical injury (and greater likelihood of an expensive hospital stay). Their review revealed no trauma patients that were excluded from the Trauma Registry and our database

- Hospital trauma staff suggested that more severe injuries to children happen in the summer months when children are not attending school. Since Period One included the summer months of July and August, they believe that it is reasonable that trauma revenue in Period One exceeded Period Two, even with a greater number of trauma patients in Period Two.

Also affecting the comparability of Period Two with future periods is the fact that Children's did not institute a charge for Trauma Consults or Activations until more than four months after Designation. A rough estimate of this unbilled revenue is $80,000 to $100,000, but corresponding collections cannot be reasonably estimated, since some payors pay on the basis of per-diem or per-discharge rates which do not reflect charges.

We are satisfied that the data we analyzed accurately reflects the actual trauma patients treated in Period Two. However, the factors noted above would suggest that the fiscal results from the first six months of Trauma Designation should not be used to project the fiscal impact on future periods.

Financial Results

As detailed in the Trauma Statements of Revenues and Expenses, the financial results are as follows:

	Contribution Margin	Trauma Gain (Loss)
Period One	$(68,867)	$(777,814)
Period Two	$(907,523)	$(1,341,891)

Collections

The percentage of charges collected for serving trauma-type patients decreased in the period after Trauma Designation (Period Two). The percentages collected for the two periods were as follows:

	Period One	Period Two
Trauma Patient Revenue	$2,247,055	$1,692,075
Trauma Patient Collections	$1,496,503	$992,716
Percentage Collected	67%	59%

Hospital personnel attributed the decrease in collections to an increase in the number of indigent patients, as well as the general tightening of payment systems to reflect cost containment pressures by payors.

Trauma Specific Costs

As previously described, Trauma Specific Costs, the costs of meeting the Trauma Standards, are deducted in full to determine the

CHILDREN'S HOSPITAL

TRAUMA STATEMENT OF REVENUES AND EXPENSES

JANUARY 1, 1987 TO JUNE 30, 1987

(Post-Designation Period)

TRAUMA PATIENT REVENUE

Medi-Cal	698,808	
Medicare	0	
Insurance	590,794	
Self-Pay	226,836	
Contract	175,637	1,692,075

LESS AMOUNT NOT COLLECTIBLE

Contractual Allowances and Bad Debts:		
Actual And Estimated	699,359	

TOTAL COLLECTIONS		992,716	992,716
TRAUMA PATIENT COSTS	FIXED	VARIABLE	TOTAL
	(Fr. Schedule Q)	(Fr. Schedule Q)	
Direct Patient Service Costs	132,574	477,194	609,768
	(Fr. Schedule Q)	(Fr. Schedule Q)	
Support Department Allocated Costs	301,794	139,034	440,828
		(Fr. Schedule M)	
Trauma Specific Costs		1,284,010	1,284,010
CONTRIBUTION MARGIN		<907,523>	
TRAUMA GAIN <LOSS>			<1,341,891>

CHILDREN'S HOSPITAL

TRAUMA STATEMENT OF REVENUES AND EXPENSES
JULY 1, 1986 TO DECEMBER 31, 1986
(Pre-Designation Period)

TRAUMA PATIENT REVENUE

Medi-Cal	1,144,834	
Medicare	0	
Contract	8,860	
Insurance	874,716	
Self-Pay	218,645	2,247,055

LESS AMOUNT NOT COLLECTIBLE

Contractual Allowances and Bad Debts: Actual & Estimated	750,552	

TOTAL COLLECTIONS		1,496,503	1,496,503
TRAUMA PATIENT COSTS	FIXED	VARIABLE	TOTAL
	(Fr. Schedule E)	(Fr. Schedule E)	
Direct Patient Service Costs	196,296	663,762	860,058
	(Fr. Schedule E)	(Fr. Schedule E)	
Support Department Allocated Costs	512,651	90,363	603,014
		(Fr. Schedule A)	
Trauma Specific Costs		811,245	811,245
CONTRIBUTION MARGIN		<68,867>	
TRAUMA GAIN <LOSS>			<777,814>

Contribution Margin and Trauma Gain (Loss). These costs, which are significant to the analysis, are as follows:

Period One	$ 811,245
Period Two	$1,284,010

Period One Trauma Specific Costs consist primarily of start-up costs, while the Period Two amounts represent ongoing costs of meeting Trauma Standards. The Period One start-up costs were removed from the costs to compare the normal costs of serving trauma-type patients without a Trauma Designation System in Period One, to the costs of serving trauma patients under the Trauma Designation System in Period Two. In Period Two, Trauma Specific Costs were allocated entirely to trauma patients. The Trauma Specific Costs for Period Two were as follows:

24-hour multi-specialty physician coverage, both on-call and on-site	$ 562,060
Emergency Room staffing and training required for trauma	377,004
Time required for Security to respond to trauma calls	855
Additional costs for 24-hour Pharmacy	13,887
Pediatric Acute trauma orientation for nurses	1,560
Additional staff and training for 24-hour Surgery and Recovery	200,884
Pediatric Intensive Care nurse training time	71,253
Laboratory staff response to trauma calls	894
Radiology technician standby costs and time spent responding to trauma calls	53,919
Respiratory therapy staff response to trauma calls	1,694
Trauma Specific Costs, Period Two	$1,284,010

Some of Children's personnel we interviewed expressed the opinion that some of the Trauma Standards, while appropriate for an adult trauma center, were not really necessary for a pediatric trauma center. For example, they suggested that the requirement to staff the operating and recovery rooms on a 24-hour basis was not essential for pediatric trauma care, since few pediatric traumas occur after midnight and on-call and trauma staff could respond adequately when they do occur. If this particular requirement did not exist, Trauma Specific Costs of approximately $200,000 might have been saved.

In the period prior to designation, Children's began following some of the trauma protocols and began responding to trauma calls as if it were a Trauma Center. Because Period One is considered a non-Trauma Designation System period, the trauma-type expenses were identified, and then removed to properly reflect regular Hospital operations.

The costs for preparing for Trauma Designation in Period One included the following items and amounts:

Planning department salaries for establishing the Trauma Program	$ 17,876
Physician contracts started prior to designation	346,291
Trauma Designation fee	10,000
Consulting services used in preparing for Trauma Designation	36,000
Trauma Department supplies and minor equipment purchases	780
Increased Emergency Room staffing and depreciation on trauma equipment	340,921
Nursing time for special projects and data collection for trauma preparation	6,300
Pediatric Intensive Care nursing time for trauma training	41,137
Training for Radiology technicians	2,059
Training for Surgery and Recovery staff	9,881
Trauma Specific Costs, Period One	$811,245

The preparation costs incurred prior to Period One must also be included in total start-up costs:

Equipment purchased for Trauma Designation:		
Equipment cost	$71,346	
Less depreciation expensed	(18,545)	
Undepreciated equipment cost		52,801
Trauma Specific Costs, Prior to Period One		$52,801

Both the Period One start-up costs and prior expenditures represent money spent to become a Trauma Center, and have no impact on future financial statements (except for the undepreciated equipment total,

which will be recognized as depreciation in future periods). These numbers are presented as a historical footnote, and should be considered along with operating results during any future negotiations.

Impact of Trauma Designation System

The comparison of a non-Trauma Designation System period (Period One) with a Trauma Designation System period (Period Two) is calculated as follows:

	Contribution Margin	Trauma Gain (Loss)
Period One	$ (68,867)	$ (777,814)
Less Period One Trauma Specific Costs	811,245	811,245
Non-Trauma Designation System Subtotal	742,378	33,431
Period Two	(907,523)	(1,341,891)
Comparison	$(1,649,901)	$(1,375,322)

Both the Contribution Margin and the Trauma Gain (Loss) show more negative results after designation than before, by $1,649,901 and $1,375,322, respectively. These figures are heavily influenced by the previously described drop in revenues from Period One to Period Two, and cannot reliably be used to determine the impact of designation. In view of the apparent seasonality of pediatric trauma, additional study is required before conclusions can be drawn about the impact of Trauma Designation on Children's.

In theory, the non-Trauma Designation System Subtotal is a measure of profits that might have disappeared had the Trauma Designation been awarded to a different facility. However, Children's position as the primary provider of pediatric trauma care in Alameda County suggests that much of the patient volume would have remained with or without Trauma Designation. If patients would not have been redirected, it is not appropriate to view this figure as a contribution margin which might have been lost if Children's had not been designated.

While comparison between the two periods is inconclusive, the following comparisons of costs within Period Two demonstrate the reasons for a negative Contribution Margin and a Trauma Loss.

- Collections for trauma patients were approximately equal to the fully allocated costs of providing regular Hospital services to these patients. The Trauma Specific Costs engendered by meeting the Trauma Standards created a negative Contribution Margin in Period Two and are approximately equal to the Trauma Loss in both periods

- Trauma Specific Costs were $1,284,010, compared with total Trauma Patient Revenues of $1,692,075 (or 76 percent)

- Trauma Specific Costs were 129 percent of the cash Collections for trauma patients

- Of the Trauma Specific Costs, $562,061 represents payments to physicians to be on-call 24 hours per day. This is equal to 57 percent of the cash Collections for trauma patients, and represents a readiness cost of nearly $1,700 per trauma patient. Physician fees for actual services performed, if the physicians' services are required, are billed and retained by Children's.

Another factor to consider in determining the fiscal impact of Trauma Designation on Children's is that the Hospital, or key operating areas such as the Intensive Care Unit, is operating at or near

capacity. If beds were not filled with trauma patients, they might have served more profitable non-trauma patients. This capacity issue suggests that measurement of the fiscal impact of Trauma Designation for Children's needs to take into consideration the average profitability of non-trauma patients in comparison to trauma patients.

Summary

The following is a restatement of the perspective provided by this analysis.

- The Hospital had better financial results from serving trauma-type patients before implementation of the Trauma Designation System
- The percentage of charges collected for services to trauma-type patients decreased slightly in Period Two, perhaps due to an increased number of indigent patients or general tightening of payment standards
- Trauma Specific Costs, including physician on-call fees, have a significant impact on the calculation of Contribution Margin and Trauma Gain (Loss) in both periods
- Trauma start-up costs should be factored into any future calculations of trauma fiscal impact, to recognize these one-time costs of gaining Trauma Center designation
- Identification of the fiscal impact of Trauma Designation for Children's should include consideration of the issue of capacity and possible replacement of trauma patients by potentially more profitable non-trauma patients.

RECOMMENDATIONS

The results of this fiscal study can be used to set the parameters for determining the financial relationship between the County and the designated hospitals. In addition, a number of non-financial factors need to be considered, and some of our recommendations relate to these non-financial factors.

- This study should be expanded to include the six-month period immediately following Period Two, to assist in determining the fiscal impact of trauma on Children's. This would allow the comparison of periods with similar seasonal patterns.

- The County should begin negotiations with Eden Hospital to determine the financial relationship between the County and Eden. The negotiations should include discussions of a designation fee to defray the County's costs of operating the Trauma Designation System, the circumstances under which the County will pay a subsidy to cover losses from serving trauma patients, and the formula to be used to calculate the subsidy (such as guaranteeing the variable costs and a negotiated percentage of fixed costs). Once the negotiations are concluded, a regular reporting program for the financial data used to calculate the designation fee and/or subsidy should be designed.

- Representatives of the County, Eden and Highland Hospitals should meet to explore ways to reduce the instances when indigent trauma patients are redirected to Eden because Highland does not have the capacity to accept them. In California, counties have the legal responsibility, under Section 17000 of the Welfare & Institutions Code, to care for indigent patients. Accordingly, when County-responsible indigent patients have been redirected to Eden, the County should explore methods to expedite their transfer back to Highland as soon as medically appropriate.

- The County Emergency Medical Services District and Children's should work together to evaluate the Trauma Standards for their applicability to pediatric trauma centers, with appropriate physician involvement.

- County representatives should work with Kaiser to determine if a modification of their standard policies can be negotiated, since the Trauma Designation System directs trauma patients to designated Trauma Centers. In such circumstances, normal policies designed to ensure that Kaiser patients obtain services from Kaiser, unless prior authorization is obtained, may not be appropriate. At a minimum, if Kaiser would make claim forms available to the Designated Trauma Centers, patients could be requested to sign them at the time of service. This would streamline the processing of trauma claims and also reduce inconvenience for Kaiser patients who suffer a traumatic injury.

U.C. BERKELEY LIBRARIES
C124897523